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Status of HPV vaccine introduction and barriers to country uptake

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ABSTRACT

During the last 12 years, over 80 countries have introduced national HPV vaccination programs. The majority of these countries are high or upper-middle income countries. The barriers to HPV vaccine introduction remain greatest in those countries with the highest burden of cervical cancer and the most need for vaccination. Innovation and global leadership is required to increase and sustain introductions in low income and lower-middle income countries.

1. The status of HPV vaccine introduction

Since first licensure of human papillomavirus (HPV) vaccines in 2006, the HPV vaccines (bivalent, quadrivalent and 9-valent) have proven to be safe, highly immunogenic and to induce strong direct and indirect protection against HPV and its sequelae [1–5]. National programs with just 50% coverage (or more) of 2 or 3 dose schedules have demonstrated a dramatic impact on population level HPV prevalence, persistent HPV infection, genital warts, and cervical intraepithelial neoplasia [5].

By the end of 2008, a quarter of high-income and upper-middle-income countries (HIC/UMIC) had introduced national HPV vaccination programs but there had been no national introductions in low- and lower-middle-income countries (LIC/LMIC). A recent study estimated that by 2014, just 1.1% of girls aged 10–20 years old in all 84 LIC/LMIC had been vaccinated with 1 or more doses of HPV vaccine, and more than two-thirds (70%) of cervical cancer cases occurred in countries without a national HPV vaccination program [6]. By October 2016, 86 countries (40% of the global total using World Bank definitions) had included HPV vaccines as a part of their national vaccination schedule, but again introductions were primarily in HIC/UMIC with 74 (55%) having national programs compared to only 12 LIC/LMIC (14%; Fig. 1) [7]. Worldwide, approximately 24% of girls aged 9–14 years are were living in a country with a national HPV program in October 2016 (World Bank population figures).

Although the proportion of LIC/LMIC with national HPV vaccination programs is still low, six new introductions took place between 2015 [8] and 2016 [9]. This doubled the number of LIC/LMIC with HPV vaccine programs, setting a new pace for national introductions in the countries who need it most (Fig. 2). In addition, a further 15 LMIC and 16 LIC had delivered HPV vaccine in at least one small scale pilot or demonstration project by May 2016 but had not yet 'scaled-up' to a national program (Fig. 1) [7].

Until October 2016, national introductions in low- and middle-income countries were facilitated through pharmaceutical companies' adhoc donations (e.g. Rwanda's introduction in 2011/12) [9], partner organization funding (e.g. Bhutan and Vanuatu who were supported by the Australian Cervical Cancer Foundation [ACCF] in 2010 and 2013 respectively) [9] and the pooled procurement mechanism of the PAHO revolving fund for governments of countries in Central and South America [7,11]. The PAHO revolving fund has secured vaccine supply at a low price for its members (2017 list price at $8.50 per dose for bivalent and $9.80 for quadrivalent) and therefore bridged the affordability gap for middle-income countries who were ineligible for other vaccine funding. With this funding support, by the end of 2016, 17 of 53 countries and territories in Central and South America had introduced the vaccine, giving theoretical access to 87% of girls aged 9–14 years living there [11].

More recently, LIC/LMIC were able to receive support through Gavi, the Vaccine Alliance (e.g. Uganda in 2015). Between 2013 and 2016, Gavi provided support to over 20 eligible countries (those with GNI per capita $\leq$ $1580 US) for 2-year HPV vaccine demonstration projects [9,12]. Gavi covered the entire cost of vaccines and injection consumables and partially financed delivery

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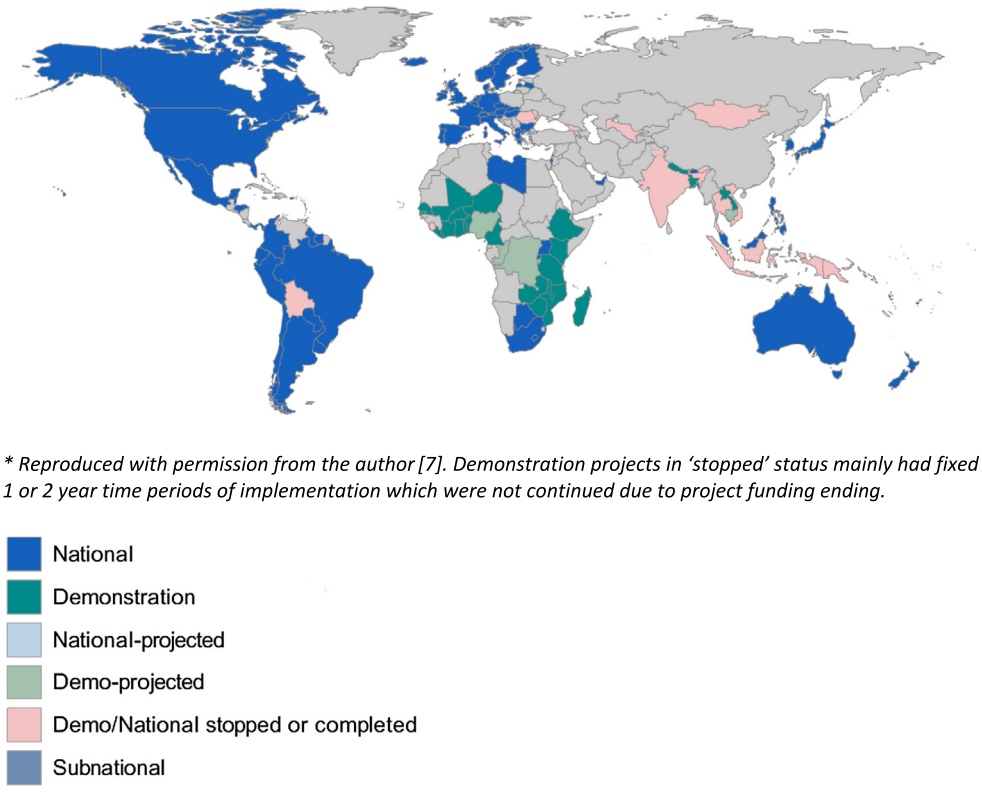

** Reproduced with permission from the author [7]. Demonstration projects in 'stopped' status mainly had fixed 1 or 2 year time periods of implementation which were not continued due to project funding ending.*

Fig. 1. Accumulation of global HPV vaccine experience, October 2016[*7]. [*]Reproduced with permission from the author [7]. Demonstration projects in 'stopped' status mainly had fixed 1 or 2 year time periods of implementation which were not continued due to project funding ending.

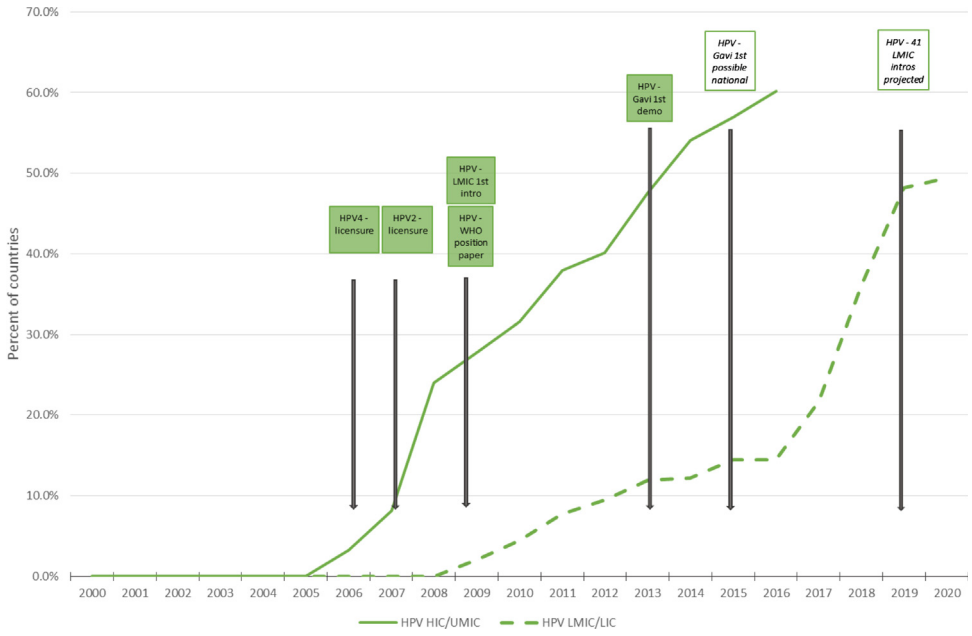

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Fig. 2. Percentage of countries that have included HPV vaccines as a part of their national vaccination schedule by country income group, 2000–2016, and projections for the future[*] [10]. [*]Adapted and reproduced with permission from the author [10].

costs for two years ($4.80 US per girl or $50,000 US, whichever amount was greater in the first year of support, and $2.40 US per girl or $25,000 US, whichever amount was greater in the second year of support). Countries were only eligible to apply for support for national programs if they had experience of delivering a multi-dose vaccine to adolescents, otherwise they could apply for national programs in the second year of their demonstration project funding [12]. Given Gavi's eligibility criteria, funding for national introduction in most LIC/LMIC only practically became available in 2015 [10]. At the end of 2017, 47 countries remained

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